ADMINISTRATIVE REPORT

AR-260-NASA

July 1966

QUARTERLY PROGRESS REPORT
1 April 1966 - 30 June 1966

Prepared for: National Aeronautics and Space Administration

Contract No.: NASr-21(11)

The RAND Corporation
SANTA MONICA • CALIFORNIA

QUARTERLY PROGRESS REPORT

1 April 1966 - 30 June 1966

(Principal Investigator: Ernest M. Scheuer)

DESCRIPTION

Under the terms of this contract RAND is conducting studies of reliability assessment for the Apollo Reliability and Quality Office, Headquarters, NASA. The work is divided into the following areas of investigation: (1) estimation of reliability growth and related characteristics during development; (2) estimation of reliability parameters from mixed sources of data; (3) reliability projection; and (4) optimal procedures in the installation of spare parts. During this quarter RAND was asked to include an additional area of investigation: (5) determination of learning plateau. The emphasis in each area is on methodology, but examples will be given to illustrate each method developed.

A two-month extension of time to complete the work on this contract has been granted. The contract had initially been scheduled to terminate on 30 June 1966.

ACTIVITY AND RESULTS

(1) Estimation of Reliability Growth and Related Characteristics

(a) Research was essentially completed during this quarter on statistical estimation procedures for the burn-in process. This work is now being documented.

(b) We prepared a draft RAND Memorandum during this quarter on procedures for determining optimum designs of reliability testing programs and optimum allocation of testing effort.

(c) The work on trouble-free runs in acceptance testing, which was complete and documented at the time RAND was asked to cease further work on the topic, is being reviewed for possible publication as a RAND Memorandum.

(d) Work is continuing on devising efficient computational procedures to implement the results obtained in RM-4749-NASA for reliability growth and debugging models.

(2) Estimation of Reliability from Mixed Sources of Data

Production runs of a computer program for the specification of a prior distribution for Bayesian reliability analysis are being made for two cases: the binomial distribution--for which the beta distribution is the appropriate prior; and the exponential distribution--with the gamma distribution as the prior. Documentation of the technique being implemented with this computer program is essentially complete.

(3) Reliability Projection

No activity this quarter.

(4) Optimal Procedures in the Installation of Spare Parts

The study of adaptive age replacement policies mentioned in last quarter's report has been documented as a draft RAND Memorandum and is being processed for publication.

(5) Determination of Learning Plateau

On 1 June 1966 we sent Mr. Fred Okano of the Apollo Reliability and Quality Office a draft entitled "Some Preliminary Ideas on the Determination of the Plateau of Learning Curve." Based on his response and on further ideas of our own, we are working on revising and adding to our draft.

(6) Other

RAND Memorandum RM-2613-2, Selected RAND Publications on Reliability, by Ernest M. Scheuer and David S. Stoller (For Official Use Only) was issued in May.

PROJECT PERSONNEL

Personnel active during this quarter were: Bennett Fox, Milton Kamins, Norbert Kaufman, Ernest M. Scheuer, David S. Stoller, Herbert Solomon (consultant), and Robert B. Wilson (consultant).